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CASE REPORT

Facial Lichen Planus Pigmentosus-Like Pigmentation Induced by Vicks VapoRub: A Case Report

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Abstract: Lichen planus pigmentosus is a variant of lichen planus characterized by gray-brown hyperpigmented macules and patches occurring in sun exposed areas. Vicks VapoRub is an inhalant ointment frequently used to relieve symptoms of upper respiratory tract infections. We report a case of lichen planus pigmentosus induced by Vicks VapoRub and successfully treated with topical tacrolimus 0.1% cream.

Keywords: lichen planus pigmentosus, Vicks VapoRub, tacrolimus, facial hyperpigmentation, lichen planus

Introduction

Lichen planus pigmentosus (LPP), a variants of lichen planus, was first described by Bhutani et al in 1974.[1] It is characterized by hyperpigmented macules and/or patches that range in color from brown to gray-brown, commonly found in sun-exposed areas, particularly on the head and neck.[2] The etiology of LPP is not known, but its development, like that of lichen planus, is thought to be driven by an immunologic mechanism. The characteristic lymphocytic inflammatory response seen in lichenoid reactions suggests that cell-mediated immunity is crucial in initiating the disease's clinical presentation.[3,4] LPP has been associated with several topical triggering agents, including mustard oil, amla oil, and *Kumkum*, a red dye used on the forehead of Indian women for religious purposes.[5]

Vicks VapoRub (VVR) is an inhalant ointment frequently used to relieve symptoms of upper respiratory tract infections. The topical application of Vicks VapoRub has been linked to a number of dermatological diseases in a few case reports.[6,7] Up to the authors' knowledge, its association with LPP has not been documented in the literature. Here, we present a case of a male patient with facial LPP secondary to a topical application of VVR that was successfully treated with topical tacrolimus 0.1% cream.

Materials and Methods

A 31-year-old Indian male, not known to have any medical illnesses, was presented to the clinic at King Fahad University Hospital with a 2-month history of hyperpigmentation involving the face. His skin lesions were asymptomatic. He denied any history of prior irritation, pruritus, or erythema. Upon further history taking, he admitted applying Vicks VapoRub only to the affected areas of face specifically the nasolabial folds, nose and bilateral temples, claiming it helped him relieve his frequent headaches. He reported using Vicks VapoRub for several months, after which he noticed the gradual development of facial pigmentation. On examination, he had multiple well-demarcated blue-gray patches with no secondary changes affecting the central face and the bilateral temples (Figure 1A–C). The differential diagnosis included

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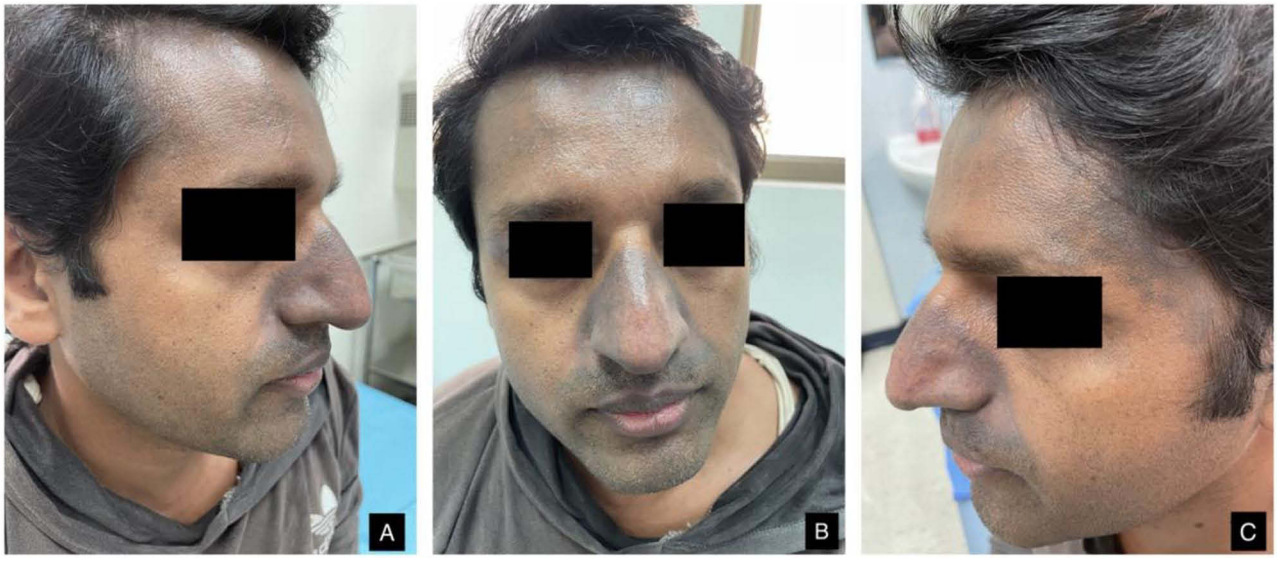

Figure 1 Multiple well-demarcated blue-grey patches affecting the face and bilateral temples. (**A**) Right side view, (**B**) frontal view, (**C**) left side view.

post-inflammatory hyperpigmentation, lichen planus pigmentosus, Riehl's melanosis and exogenous ochronosis. Two 4 mm skin punch biopsies were taken and sent for histopathological examination. The biopsies showed focal vacuolar basal cell damage of the epidermis and superficial perivascular lymphohistiocytic infiltrate in addition to pigment incontinence (Figure 2A and B). The clinical and histopathological changes were consistent with a diagnosis of LPP, however, given that overlapping features exist between LPP and Riehl's melanosis, we have labelled that patient as having LPP-like pigmentation. We have prescribed topical tacrolimus 0.1% cream to be used daily on the affected areas and gave future follow-up. The patient presented 6 months later with a significant improvement of his skin's hyperpigmentation (Figure 3A–C).

Discussion

Vicks VapoRub is comprised of several active and inactive ingredients. The active ingredients include camphor, eucalyptus oil, and menthol. The inactive ingredients are petrolatum, thymol, turpentine oil, nutmeg oil, and cedarleaf oil. Thymol, a phenol derivative, has been linked to the development of chemical leukoderma in one case.[6] Another report demonstrated a link with allergic contact dermatitis, most likely owing to eucalyptus oil and cedarleaf oil.[7]

Szykut-Badaczewska et al reported that the primary dermatoscopic features of LPP consist of diffuse, structureless brownish pigmentation. Additionally, the presence of gray, blue, or brown dots creates a "peppering" effect. Globules or clods with similar colors may also be observed. Perifollicular pigmentation and white dots are less frequent findings. Notably, Wickham's striae are typically absent in LPP.[8]

The etiology of LPP is not completely understood. It may be triggered by sun-exposure, infections, or the application of topical agent such as mustard oil, amla oil, and red dyes. It is proposed that the mechanism in which these topical agents may induce LPP is through photosensitivity, as many of them have been demonstrated to be potent photosensitizers.[9] On the other hand, post-inflammatory hyperpigmentation (PIH) characterized by acquired skin darkening typically arises secondary to cutaneous inflammation that can be caused by a wide range of factors, including inflammatory skin diseases, autoimmune disorders, medical interventions, and physical trauma. Histopathologically, PIH differs from LPP due to an increase in the number (hyperplasia), size (hypertrophy) and proliferation of melanocytes associated with an increase in epidermal melanin deposition with minimal alterations in the dermis.[10] In contrast, LPP is characterized under microscope by vacuolar degeneration of the basal cell layer, associated with pigment incontinence and keratinocyte apoptosis. In some instances, mild epidermal atrophy may be observed, along with hyperkeratosis

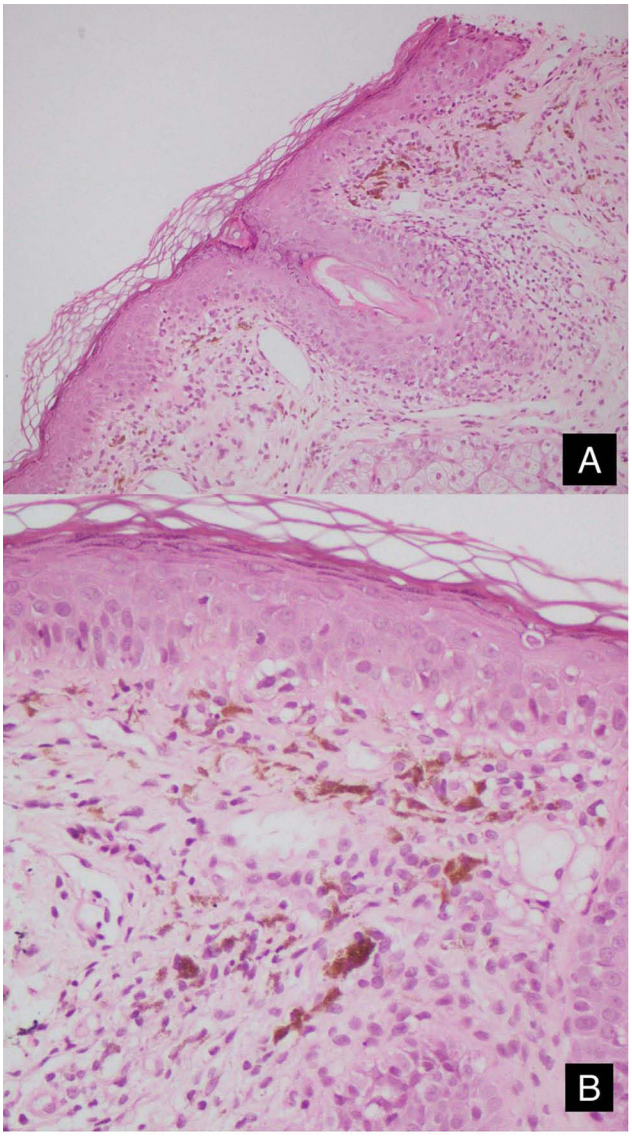

Figure 2 (**A**) histologically, lesions showed vacuolar basal cell damage of the epidermis and superficial perivascular lymphohistiocytic infiltrate, apart from pigment incontinence. (H&E, X100). (**B**) pigment incontinence in the superficial dermis is the histopathological hallmark. (H&E, X200).

displaying a basket-weave pattern. In addition, the dermis is characterized by a lichenoid infiltrate, consisting of a band-like lymphohistiocytic inflammatory infiltrate, and melanin incontinence with scattered melanophages.[11] Moreover, exogenous ochronosis (EO), which is one of the differentials of LPP, is a rare skin disorder characterized by blue-black discoloration, mainly caused by the excessive use of skin-lightening creams, particularly those containing hydroquinone.[12] Additionally, Riehl's melanosis is an acquired pigmentary condition that primarily develops in individuals with darker skin, especially older women. It presents as brown-gray, reticulated or diffuse patches of hyperpigmentation on the face, neck, and upper chest. The disease is thought to result from a type IV hypersensitivity reaction triggered by contact with allergens such as fragrances, textiles, or cosmetics.[13] Ding et al noted that the main histopathological feature of Riehl's melanosis is similar to LPP, which is characterized by vacuolar degeneration of the basal layer, leading to pigment incontinence and involvement of pilosebaceous units. This is accompanied by increased dermal melanophages, as well as perivascular, epidermal, and dermal inflammation caused by lymphocyte,

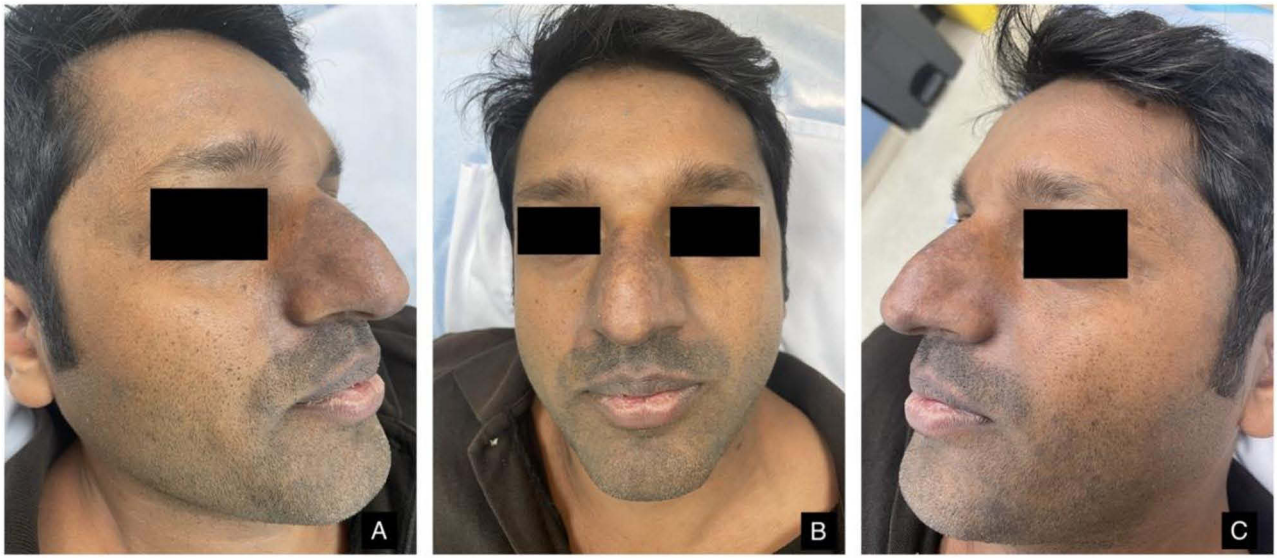

Figure 3 Significant improvement with after 6 months of therapy with topical tacrolimus 0.1% cream. (**A**) Right side view, (**B**) Frontal view, (**C**) Left side view.

mononuclear cell, and eosinophil infiltration, along with interface changes. However, all these histopathological findings are nonspecific for Riehl's melanosis.[14]

LPP-like pigmentation following the application of VVR has not been reported in the literature. In the case presented, the patient denied a history of using any other topical agents such as skin lightening products or fragrances on the affected areas. We propose that the development of cutaneous pigmentation was secondary to photosensitivity, due to one of the oil components of the product. Tacrolimus topical application was found to be successful in the treatment of LPP as reported by Al-Mutairi et al. They found that a treatment duration of at least 8 weeks was necessary before any substantial improvement can be seen. In addition, Rodriguez et al have also successfully treated a patient with linear LPP on the face with topical tacrolimus.[15,16]

Conclusion

Vicks VapoRub contains many natural oils that may work as photosensitizers. We proposed that LPP-like pigmentation may be associated with photosensitivity. We present a case demonstrating the association between LPP-like pigmentation and VVR with successful treatment by topical tacrolimus 0.1% cream. With only a few cases of tacrolimus usage in patients with LPP found in the literature, we hope that our case acts as a catalyst for future research endeavors in this area.

Patient Consent Statement

Written informed consent was obtained from the patient before treatment and again for the publication of this case report including the publication of the patient's images. All personally identifiable information has been removed or altered to protect the patient's privacy and ensure confidentiality.

Institutional Review Board Approval

This project received approval from the Deanship of Scientific Research and Ethics Committee at Imam Abdulrahman Bin Faisal University, and consent was obtained from the institutional review board at Imam Abdulrahman Bin Faisal University to publish this case.

Disclosure

The authors report no competing interests in this work.

References

1. Bhutani LK, Bedi TR, Pandhi RK, Nayak NC. Lichen planus pigmentosus. *Dermatologica*. 1974;149(1):43–50. doi:10.1159/000251470
2. Rieder E, Kaplan J, Kamino H, Sanchez M, Pomeranz MK. Lichen planus pigmentosus. *Dermatol Online J*. 2013;19(12). doi:10.5070/D31912020713
3. Hong S, Shin JH, Kang HY. Two cases of lichen planus pigmentosus presenting with a linear pattern. *J Korean Med Sci*. 2004;19(1):152–154. PMID: 14966361; PMCID: PMC2822256. doi:10.3346/jkms.2004.19.1.152
4. Krasowska D, Schwartz RA, Lecewicz-Torun B. Generalized lichenoid drug eruption following Blaschko lines. *Int J Dermatol*. 2001;40(12):774–776.PMID: 11903676. doi:10.1046/j.1365-4362.2001.01187-2.x
5. Gupta D, Thappa DM. Dermatoses due to Indian cultural practices. *Indian J Dermatol*. 2015;60(1):3–12. doi:10.4103/0019-5154.147778
6. Boyse KE, Zirwas MJ. Chemical leukoderma associated with Vicks VapoRub. *J Clin Aesthet Dermatol*. 2008;1(4):34–35. PMID: 21212846; PMCID: PMC3016932.
7. Noiles K, Pratt M. Contact dermatitis to Vicks VapoRub. *Dermatitis*. 2010;21(3):167–169. [PMID: 20487662]. doi:10.2310/6620.2010.09101
8. Szykut-Badaczewska A, Sikora M, Rudnicka L, Kittler H. Dermatoscopy of cutaneous lichen planus – attempt to translate metaphoric terminology into descriptive terminology. *Dermatol Pract Amp*. 2023;e2023174. doi:10.5826/dpc.1303a174
9. Mendiratta V, Sanke S, Chander R. Lichen planus pigmentosus: a clinico-etiological study. *Indian Dermatol Online J*. 2019;10(3):288–292.PMID: 31149573; PMCID: PMC6536068. doi:10.4103/idoj.IDOJ_253_18
10. Maghfour J, Olayinka J, Hamzavi IH, Mohammad TF. A focused review on the pathophysiology of post-inflammatory hyperpigmentation. *Pigm Cell Melanoma Res*. 2022;35(3):320–327.PMID: 35306737. doi:10.1111/pcmr.13038
11. Ghosh A, Coondoo A. Lichen planus pigmentosus: the controversial consensus. *Indian J Dermatol*. 2016;61(5):482–486.PMID: 27688435; PMCID: PMC5029231. doi:10.4103/0019-5154.190108
12. Lazar M, De La Garza H, Vashi NA. Exogenous ochronosis: characterizing a rare disorder in skin of color. *J Clin Med*. 2023;12(13):4341.PMID: 37445377; PMCID: PMC10342381. doi:10.3390/jcm12134341
13. Daadaa N, Sathe NC, Ben Tanfous A. Riehl Melanosis 2024 Apr 8. In: *StatPearls [Internet]*. Treasure Island (FL): StatPearls Publishing; 2024. PMID: 32491369.
14. Ding Y, Chen Y, Zhang L, Li W, Liu X. Unveiling the mystery of Riehl's melanosis: an update from pathogenesis, diagnosis to treatment. *Pigm Cell Melanoma Res*. 2023;36(6):455–467. doi:10.1111/pcmr.13108
15. Al-Mutairi N, El-Khalawany M. Clinicopathological characteristics of lichen planus pigmentosus and its response to tacrolimus ointment: an open label, non-randomized, prospective study. *J Eur Acad Dermatol Venereol*. 2010;24(5):535–540.PMID: 19840200. doi:10.1111/j.1468-3083.2009.03460.x
16. Rodriguez E, Hutson S, Akintilo L, et al. Acute onset linear lichen planus pigmentosus of the forehead: a case series. *J Drugs Dermatol*. 2023;22(1):94–97. doi:10.36849/JDD.7200